

REMARKS

A typographical error has been corrected in claim 15.

Claims 12-14, 16 and 21-24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,087,032 to Yoshitake *et al.* ("Yoshitake") in view of WO 89/12107 to Brown ("WO '107"). Claim 15 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshitake" and WO '107 in view of U.S. Patent No. 5,207,826 to Westland *et al.* ("Westland").

Yoshitake was cited as disclosing a fuel cell comprising an electrolyte membrane, a fuel electrode and an air electrode. The Office Action concedes that Yoshitake does not disclose specific anode or cathode material.

In WO '107, some uses of bacterial cellulose are broadly described, and WO '107 does mention "a specialty carrier, such as for battery fluid and fuel cells" at page 3, lines 32-33. WO '107 also mentions "materials having special electronic effects produced by coating the individual microbial-produced, cellulose, microfibrils with appropriate components, such as metals by vapor deposition or epitaxial growth" (see page 3, line 34 to page 4, line 2 of WO '107), and also describes the vaporizing of platinum on cellulose films at page 26, lines 14-17.

Westland was cited in the Office Action as teaching that a base medium for bacterial cellulose may comprise metal salts and that bacterial cellulose can be coated with metals. However, Westland says nothing about the deposition of the metal from metal salts as recited in pending independent claim 12.

There are fundamental differences between the invention of pending claim 12 and the teachings of Yoshitake, WO '107, and Westland. The methods used by

Yoshitake, WO '107 and Westland for the incorporation of metal particles can employ one of two processes: (1) preformed metal particles that are entrapped in the cellulose matrix during a sheet casting process; or (2) metal particles that deposited or epitaxially grown on the surfaces of the cellulose by vaporization of a metal.

In pending independent claim 12, the deposition of metal catalyst particles is from the corresponding metal salt (e.g., hexachloropalladate) in solution that is infused into the natural cellulose structure. Particle formation is then initiated by reduction of the metal salts (e.g., hexachloropalladate) by the reducing ends of the cellulose chains.

The method for disposing the catalyst on the electrode as in pending independent claim 12 has advantages over prior art vapor deposition methods. For example, the metal catalyst loading in or on the electrode support structure can be readily varied by controlling the amount of metal salt and the incubation time. Also, the co-precipitation of different metals can be achieved. See page 10, lines 29-32 of the specification. Furthermore, vapor deposition methods do not provide for effective deposition of metal in the internal pores of the electrode as in the present invention. In contrast, the claimed invention allows for infusion of the metal salt into the pores of the cellulose. Thus, the product of claim 12 is distinguishable from the product that would be created using the teachings of Yoshitake, WO '107, and Westland.

The citation of M.P.E.P. § 2113 regarding Product-by-Process Claims in the Office Action has been noted. In order to provide evidence that the claimed product is necessarily different from the prior art's product, an Inventor's Declaration under 37 C.F.R. § 1.132 is attached. In the Declaration, the first named inventor, Dr. Barbara R. Evans, provides evidence that the claimed product is necessarily different from the prior

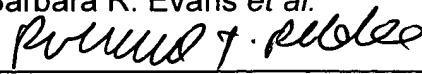
art's product. For example, it is stated in the Inventor's Declaration that "relatively slow growth of the metal particles using the method described in the present invention results in high crystallinity of the particles, as has been demonstrated by Transmission Electron Microscopy (TEM) images."

In summary, (1) Yoshitake does not disclose the use of bacterial cellulose in an electrolyte membrane or a fuel cell anode or a fuel cell cathode as recited in claim 12; and (2) Westland and WO 89/12107 do not describe precipitation of a metal catalyst from a metal salt in bacterial cellulose as specifically recited in claim 12. Thus, all of the limitations of pending independent claim 12 (and claims 13-16 and 21-24 that depend thereon) are not taught in any combination of Yoshitake, Westland and WO 89/12107. Furthermore, the Inventor's Declaration provides evidence that the precipitation of a metal catalyst from a metal salt in bacterial cellulose renders the claimed product necessarily different from the prior art's product.

Conclusion

It is submitted that the entire application has been placed in condition for allowance. Other than the one month extension fee, no other fees are believed to be needed for this amendment. If fees are needed, please charge them to Deposit Account 17-0055.

Dated: December 10, 2004

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